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ABSTRACT

This paper examines research on the individual needs of gifted children, with a special focus on underachieving gifted students, and provides results of a study of students in a 10-week after-school enrichment program in Queensland, Australia. Over 300 gifted children (ages 5-8) attended the program, and five case studies are provided using information from parent and child interviews, tutor notes, classroom observations, and video recordings. Two of the students discussed conform to standard teacher expectations of gifted students, while the others show a variety of signs of low self-esteem, withdrawn or aggressive behavior, inability to concentrate, resistance to teacher efforts to motivate, and poor peer relationships. While such traits are often associated with low achievement, these students demonstrated performance on a level with or above that of high achievers, and demonstrated no negative behaviors. It is concluded that intervention needs to recognize the importance of identification strategies, careful nurturing, and programming which reinforces opportunities for students to become autonomous yet cooperative learners. (Contains 43 references.) (PB)

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Off with the fairies or gifted? The problems of the exceptionally gifted child

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OFF WITH THE FAIRIES OR GIFTED? THE PROBLEMS OF THE EXCEPTIONALLY GIFTED CHILD

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ABSTRACT

Coping with the exceptionally gifted child in the classroom is a challenging task. Extensive research has provided several models for engaging children in both enrichment and extension activities. Whether these approaches can be applied within the school depends on a community willing to implement effective strategies. Indeed much research suggests that gifted programmes should be conducted outside of schools. Experience gained through the operation of university-based programmes for young gifted children has provided insight into a number of strategies that can be effectively implemented in schools. However, experience has also shown that motivational factors play an important role in the success of any such intervention.

INTRODUCTION

The recently completed Review of the Queensland School Curriculum (1994) acknowledged that "concern for gifted students is based on social justice principles". The report identified special groups of gifted and talented students including underachievers, girls and children from "culturally disadvantaged populations" as having been neglected and due for special attention. These sentiments echo international concern about the education of the gifted and highlight the need to develop a broad response that incorporates strategies for identification, support for the nurturing of the gifted in their normal classrooms and provision of opportunities for the full development of potential. Substantial research has identified a number of primary needs of gifted and talented students: early identification, student autonomy, opportunities to interact with peers of similar abilities, attention to both cognitive and affective needs, homogeneous grouping by aptitudes, and recognition of individual needs (George, 1983). It is this latter issue concerned with meeting individual needs that is the focus of this paper, in particular as it concerns the underachieving child. The underachiever may include a range of potentially gifted children variously identified as *challenging*, *underground* and *dropouts* (Betts & Neihart, 1988). Davis and Rimm (1985) argue that many observable traits of underachievement including poor study habits, poor concentration, and discipline problems are due to learned helplessness and low self esteem. Thus, both cognitive and affective factors and their interaction contribute to underachievement. As these factors are mediated through the social context we recognise the important role of parents and teachers in moulding an appropriate environment. The cognitive perspective provides clues to what role the environment, teachers and parents can assume to prevent underachievement and facilitate the realisation of giftedness.

Responding to the Challenge

Although the Queensland Curriculum Review highlighted the challenge facing all stakeholders, it expressed concern that teachers are generally inadequately prepared in teacher education courses or inservice programmes to provide for the needs of gifted students, including the underachiever. In response to these recommendations the Education Department proposed the establishment of new projects to determine the strategies necessary

to address the needs of gifted and talented students in state schools (Minister for Education, Qld, 1994). Whether new projects of the type envisaged are necessary is problematic since substantial advances have been made in the education of gifted children over the last twenty years. The literature on the teaching of gifted and talented children is extensive and provides a substantial framework for developing and implementing programmes that meet the needs of these children (Torrance, 1986). By the mid 1980's many successful programmes had been described in the US and elsewhere with a general consensus that programs for the gifted should be an integral part of the school system (Sisk, 1980) but it has been noted that a trend away from enrichment in regular classrooms exists. This trend may reflect the lack of support for classroom teachers as indeed the Queensland review argued that "curriculum materials are generally unresponsive to the need to 'extend' gifted students." Thus, while there is extensive advice on the types of enrichment programmes and strategies available, the real problem is that classroom teachers need support to be able to identify who are the gifted, to provide the appropriate environment within the classroom and to select the best intervention and enrichment for particular children. Previous research suggests that teachers are only 10-50% successful in identifying gifted children in their classes because they tend to select the hardworking, compliant students rather than the ones who are indeed gifted (Fox, 1981). The diversity of the nature of giftedness clearly contributes to the difficulty of identification and provision of supportive strategies in the classroom.

Giftedness—the Changing Face

Intelligence has been a concept that thinkers have grappled with since the time of the Plato. In the eighteenth century writers such as Kant were identifying genius as a talent for producing that for which no definite rule can be given and consequently originality was at the core of giftedness. Galton, Binet and Terman adopted formal testing procedures to measure intelligence and defined giftedness as intelligence quota (IQ) of above 130. In more recent times there has been a re-evaluation of the concept of giftedness. The work of Torrance in the 1960's focused attention on creativity as an important element of giftedness (Torrance, 1974). The description of giftedness was further broadened to include persistence, (Renzulli, 1978), talents (Tannenbaum, 1983) and multitalents in art, music and performance (Khatena, 1989). Thus the general identification of giftedness has tended to become more inclusive of a variety of talents as opposed to a narrow measurable quantity. Bringing some structure to the field, Gardner (1983) postulated a multidimensional model comprising seven relatively autonomous forms of intelligence: linguistic, musical, logical-mathematical, spatial, bodily-kinaesthetic, interpersonal and intrapersonal. This model broadens the conceptualisation of giftedness and further challenges teachers to identify and support the needs of children who excel in any of these forms. A comprehensive list of characteristics including ease of learning, verbal proficiency, persistence, concentration, acute perceptiveness, idealism, self awareness, sense of humour and adult orientation has been prepared for use by teachers in Queensland (Deptartment of Education, Qld, 1988).

Finally, an interesting caveat is raised by Sternberg (1993) who argues that judging giftedness is relativistic. He introduces a *value criterion* by which a gifted person must show superior performance in a dimension that is valued for that person by his or her society. Thus socially and culturally mediated feedback to the individual impacts on motivation and goal setting. This interaction is important to consider. Indeed, Garcia and Pintrich (1994) argue that in order to understand how students regulate their own learning one has to bridge affective and cognitive models of learning. Therefore, we will now consider the cognitive basis of

giftedness from an information processing perspective and also explore the role of motivation as it influences gifted performance.

Cognitive Processes Underlying Giftedness

In constructing an explanation of giftedness Sternberg (1986) proposed a triarchic theory of intelligence that encompasses *intelligence and the internal world, intelligence and experience* and *intelligence and the external world.* Sternberg's identifies the characteristic of *insight* or the ability to deal with novelty as a factor differentiating the gifted from the average child. In addition to describing the internal components of intelligence, Sternberg explains the effects of experience and environment on intelligence, aspects which have implications for the education of gifted children because of the interaction with the affective domain.

The Internal World

Sternberg's internal world comprises three components: metacomponents, performance components and knowledge-acquisition components. Although all people possess these components the exceptional display these in greater degree. *Metacomponents* are demonstrated through higher levels of executive planning and decision-making skills. Gifted students' metacognitive proficiency also extends to their knowledge about strategies which optimise remembering, for example *remembering cues* (Borkowski & Kurtz, 1984). Thus, gifted performance reflects superior metacognitive ability manifested in a perceptive understanding of their own cognitive strategies and subject to self-appraisal and management (Cheng, 1993; Paris & Winograd, 1990). Cheng (1993) argues that metacognition is an important characteristic displayed in the gifted, and metacognitive performance and flexibility of cognitive style are distinguishing characteristics of giftedness. The development of metacognitive skills may be conditional on the social interaction experienced in the home and school (Moss, 1990; Kurtz, 1990).

In contrast to the higher order nature of metacomponents, *performance components* are lower order processes which execute metacomponential decisions. For example, inductive reasoning involves the processes of encoding, inference, mapping, application, comparison, justification and response which may be used in tasks such as matrices, analogies, series completion and classifications (Sternberg, 1990).

The gifted also excel in their ability to analyse, synthesise and evaluate newly acquired information, and in their decontextualisation skills in constructing solutions to new problems requiring transfer of previously learned strategies and content. These *knowledge acquisition components* include selective encoding (disembedding relevant information), combination (building relationships between information) and comparison of information (making appropriate links with stored information). The proficiency and integration of these processes to a high order is manifested as *insight* (Davidson, 1986). Gifted children possess the capacity to generate insight spontaneously to produce solutions to novel problems.

Supporting Sternberg's focus on the internal world is the neuropsychological analysis of information processing explored by Luria (1973). Luria's model posits that information is processed in two possible modes—simultaneous and successive, regulated by control functions in the higher centres of the brain. Positive relationships among information processing style, intellectual giftedness, reading ability and scientific problem solving have been observed. Findings indicate that intellectual giftedness is related to information

processing specifically in the area of simultaneous processing (Hafenstein, 1990; Watters, 1993; Watters & English, 1995). Sequential processing appears to be related to reading recognition, while simultaneous processing has a closer relationship to reading comprehension (Hafenstein, 1990).

The Role of Experience

A child's experiences provide the opportunities to apply cognitive processes to particular situations and problems. Sternberg argues that much of our behaviour is scripted and thus performance in familiar environments or with familiar problems is to a large extent automatized (Sternberg, 1990, p275). Functioning in a novel situation requires insight in the application of knowledge acquisition components, a repertoire of performance strategies and high levels of metacognition. Ideally these novel experiences should occur in a context that has personal relevance and meaning for the child.

The External World

The third aspect of Sternberg's theory concerns the interaction between intelligence and the external world which is substantially influenced by the socio-cultural context. What behaviour is acceptable, what is expected, what is appreciated as gifted, the influence of culture, role and responsibilities of parenthood, and the teaching and learning environment are all elements of the socio-cultural context within which children develop. Horowitz and O'Brien (1985) proposed that the interaction between environmental and organismic variables (nurture/nature) contributes to giftedness. Vygotsky (1987) also argued that key learning processes that promote regulatory or executive processes (metacognition) involve interactions with more mature or knowledgeable individuals and thus environmental and cultural factors are associated with intellectual performance. Sternberg argues that intelligent thought is directed towards adapting oneself to the external environment. If this is unsuccessful one may attempt to shape the environment. Such behaviour is seen by Sternberg as the "quintessence of intelligent thought". However, opportunities for shaping their environment may not exist for young children who are constrained by family and school structures. When adaptation and shaping fail, selection of an alternative environment may be the final resort for many children who indulge in daydreaming, behavioural disturbances and in later years—"dropping out".

Developing Interest and Motivation

The environment should empower the student to reach full potential by addressing their needs as learners which are different to normal children (Schunk & Swartz, 1993). A supportive environment should include opportunities for the development of self efficacy, confidence in one's own ability and autonomy as a learner. Underachievement, may be the outcome of inappropriate provision of these opportunities. An environment that provides appropriate patterns of interactions and cognitive mediation is a critical factor in the development of intellectual and motivational skills (Portes, 1991; Renshaw & Gardner, 1990; Freeman, 1993). However, what is the role of motivation?

Renzulli's Triad Model of the gifted child has been one of the most influential guides for the provision of intervention programmes for gifted children (Renzulli, 1978). Above average ability, creativity, and task commitment are described as contributing aspects of giftedness. The model specifically incorporates motivation as an identifiable characteristic but been criticised on this account. Gagné asserts that motivation is not a part of giftedness but rather a facilitator of giftedness (Gagné, 1985). The issue at stake is that motivation is an expression

of persistence and interest, dependent on both internal and external situations and may not be consistently manifested in task commitment (Feldhusen & Hoover, 1986).

The underachieving gifted child could be low on levels of motivation due in part to the quality of feedback (Freeman, 1993). If the child is experiencing an environment where tasks are unchallenging, not intrinsically interesting or simply routine, some gifted children conform and attempt to please while others will withdraw and may exhibit disruptive behaviour and become underachievers. In classrooms, interactions between teachers and perceived high achievers is more constructive, involves more and higher quality feedback and produces more intrinsic motivation than interactions with lower achievers (Leder, 1987; Weinstein, Marshall, Brattesani, & Middlestadt, 1982). Attention to the affective dimension is emphasised in Bett's (1986) model curriculum. The model supports Gagné's focus on motivation by arguing that the gifted child should be an autonomous learner who is enthusiastic about learning, has a good sense of self, is intrinsically motivated and psychologically healthy.

Summary

In reviewing the major theoretical positions on giftedness we have sought to clarify issues that may be of practical advantage to practising teachers and parents. The Sternberg and Luria theories are attractive because they provide a cognitive model with which one can interpret and predict behaviours. The theories of Gardner and Renzulli are appealing because they widen definitions and provide parsimonious models on which interventions may be developed. Indeed the emphasis becomes one of talent development where eclectic approaches are implemented to meet the needs of a range of gifted children. However, this still assumes that we can recognise talent in all children. The underachiever, the student whose environment is not matched with their internal processes will slip through.

We have also emphasised the role of feedback that generates motivation, a sense of self efficacy and conditions for the development of self-regulated learning. It is our proposition that many children if not supported in the classroom will not be motivated and will join the ranks of the unseen gifted typified by lack of underachievement and disinterest in learning.

This paper draws upon research conducted in schools which has highlighted the cognitive strategies of successful students in science (Watters, 1993; Watters & English, 1995). In particular the previous research showed a relationship between achievement in science problem solving and levels of simultaneous synthesis. The research also identified a small subgroup of children who were potentially underachievers. The paper also draws upon our experience of providing enrichment programmes for talented children. Informed and influenced by a concern for children who showed characteristics of non-involvement, boredom and mind wandering, we sought to examine the selection processes and participation aspects of selected children who attended the enrichment programme. The study describes the background process of identifying the children described as "off with the fairies" and examines several typical and atypical children experiencing enrichment.

THE STUDY

Subjects

The children described in this study were attending a 10 week enrichment programme operating for one hour and a half after school at the University. Children aged 5-8 years were selected by consideration of a descriptive profile provided by the parents, the teacher and

principal. Each session catered for about 18 children drawn from a range of schools. At the beginning of the programme most children were strangers to each other. The cases discussed here were selected from different workshops run in different years.

Data Sources

Data were collected from a variety of sources including: interviews with parents, interviews with children, field notes taken by tutors working in the programme, profiles provided by teachers and parents in the application for admission process, observations of children in activities recorded by the researchers, children's workbooks and video recordings of group work. These data represent elements of a wholistic analysis of the representative children's interactions and behaviours within the programme.

The Enrichment Programme

The enrichment programme that these children experienced was designed to achieve three major objectives: broaden interests, develop social interaction and to provide opportunities for the development of problem solving and reasoning skills. As such, the programme did not adopt a structured approach but tended to provide a skeletal framework in which children engaged in open ended activities that allowed them flexibility. A facilitator co-ordinated the programme and was supported by two tutors who were employed and instructed to provide support in ways that recognised the desirable learning strategies and processes of children in science. The tutors had completed courses that involved instruction in these principles.

In the early weeks of the programme the children were encouraged to work in groups but as interests developed they were allowed to work individually. Initial workshops involved activities designed to develop autonomous learning in a supportive social environment where interaction of ideas was encouraged. A diverse range of concepts were explored and the application of process skills were implemented through activities involving, for example, geometry, rainforest exploration, building telescopes, astronomy, design and construction using Lego, Capsela, Zaks, paddle pop sticks etc., chromatography, flight and rocketry, physics of music, mathematical puzzles and games. As the programme developed the students were expected to become more responsible for exploring concepts and constructing their own explanations and elaborations and to provide defensible arguments for their own ideas. The focus was not on information gathering in a structured format but rather on problem solving. While students were required to keep workbooks only independently generated information was recorded.

The responses of Diversely Identified Gifted Children to the Programme

Five children, two girls and three boys (Table 1) are profiled from over 300 5-8 year-old children who have attended the workshops during the past five years. These cases represent a range of gifted children some of whom were clearly identified by teachers as high performers while others appeared to be performing at levels below their potential.

Table 1
Selected cases representative of broad behavioural and extrinsic characteristics

Name	Characteristic classroom behaviour	Achievement at school tasks
Gordon	Task oriented, motivated, confident, quiet and socially well adapted	Very high achiever
Kathy	Works quickly, self assured, reflective, quiet	Very high achiever
Martin	Reflective independent thinker, enthusiastic contributor to class, but "drifts off"	Not always successful in routine tasks
Sally	Eccentric and unconventional, displays boredom with classroom tasks, a lateral thinker	Achievement very selective and inconsistent
Aaron	Visual thinker, disruptive if activities not challenging, skips details	Does not excel in normal classroom activities

Gordon and Kathy are typical high performing and gifted children. Indeed, Kathy could be described as an outstanding student who had won a range of awards for essays, science projects and mathematics competitions.

However, such explicit high performance is not seen in all gifted children. It is only when sensitive teachers recognise in children's erratic or unusual behaviour indicators of exceptional potential, or teachers respond to desperate parents, that these children are nominated. Three of these children are profiled (Martin, Sally, Aaron).

Gordon and Kathy were recommended for the programme by classroom teachers with strong support from principals and parents. Both children were identified by parents and teachers as high achieving, co-operative and insightful students who used advanced vocabulary, had a quick recall of factual information and were persistent at completing tasks. These classical characteristics of giftedness were corroborated during the programme by tutors and the researchers. Indeed both these children were so obviously gifted that they re-nominated, and despite competition for places, were accepted into the programme on second occasions. The three children who did not conform to the typical pattern of giftedness each displayed idiosyncratic behaviours but nevertheless gave clues to sensitive teachers of their potential.

Martin could present an enigma for teachers. On one hand he is a classic performer because he is a self motivated, independent learner who seeks information and follows through with further reading and project work. However teachers commented that he "thinks differently and his interests vary from those of his peers". Furthermore, his mother is reflective about his behaviour and describes her dilemma as one of confusion: Is Martin brilliant or strange? This reaction typifies the importance of feedback on self concept. Explicit and implicit feedback impacts on his perception of self which was quite insecure. For example, Martin reflected on how it was difficult for him to talk with other children and how their reactions to his interests were negative. Indeed, he perceived himself to be strange until he experienced the interaction in the enrichment programme which made him feel more accepting of his differences because he had met a whole group of like-minded children. At the end of the enrichment programme he stated that he "felt OK" about himself. Martin is potentially at risk of becoming an underachiever and is very dependent on supportive parents and teachers to shape his environment. His potential is not consistently recognised nor rewarded leading to interpersonal problems that consequently

may cause him to reject or deny his potential to become socially acceptable (Passow, Mönks & Heller, 1993).

Erratic classroom performance and behaviours inconsistent with expected values and roles mitigate against the likelihood of teachers identifying some children as gifted. Such a child is Sally. For example, her mathematical performance is a concern because achievement ranges from complete mastery to total failure. Her behaviour is seen to be atypical and even her parents commented that they saw her as very much like a boy. She tends to be a tinkerer, pulling things apart to fill in time, practices that are not usually observed in girls. However, the teacher recognised that she exhibited characteristics of giftedness that set her apart from her peers such as persistence, verbal and numerical fluency and curiosity. Strong willed and assertive, Sally may be less inclined to conform at this stage of her life but negative feedback may generate intrapersonal conflicts with her perceptions of self and in future she may decide to conform to social expectations. Indeed, the number of girls identified by teachers for the enrichment programme is very small but among those who are nominated "boyish-like", assertive and eccentric behaviour is noticeable. Acceptance of this behaviour is important to avoid the stereotyping of girls that can lead to underachievement.

Exemplifying the "off with the fairies" child is Aaron. Identified as precocious by his parents in a range of activities from an early age, his performance in class is a major concern to both his teacher and parents. His teacher notes that although he becomes absorbed in science activities, and exhibits competence at tasks well beyond his age he frequently fails to produce a written product and often leaves normal classroom tasks unfinished. At times his frustration and impulsiveness is evident in the level of disruption in which he engages. This child also exhibits very high levels of spatial reasoning and behaviours parallelling those identified among highly simultaneous processors in previous studies (Watters, 1993; Watters & English, 1995). Strong support from this child's parents and a reflective teacher ensured that Aaron was identified. However, his erratic behaviours, lack of commitment, and daydreaming will present a model that other teachers may not be sensitive to and therefore respond negatively.

CONCLUSIONS

This paper has presented case studies demonstrating contrasting characteristics and behaviours of gifted children. Two students clearly conform to teachers' expectations of giftedness and present as extremely highly achieving children. In the enrichment programme they confirmed their teachers' and parents' expectations. Three other children less obviously gifted and already showing signs of underachievement and frustration in their classroom environment adapted to the programme with alacrity. In their classrooms these children showed signs of low self-esteem, withdrawn or aggressive behaviour, inability to concentrate, resistance to teacher efforts to motivate and difficulty with peer relationships. These are all behavioural characteristics identified by Butler-Por (1993) of underachievers. In contrast, their performances on the tasks undertaken in the enrichment programme were qualitatively similar to those of the high achieving children and there was an absence of negative behavioural characteristics. These children in some respects were more intense and involved with activities, persisted longer and were more independent than the high achievers. Aaron would, for example, follow up activities with work at home which he brought back to display to his peers. The power of the social interaction was also more evident for Sally, Martin and

Aaron than for Gordon and Kathy. For example, Sally revelled in the opportunity to tinker, a practice discouraged at school.

From this experience we conclude that intervention needs to be cognisant of three major issues—identification strategies, careful nurturing and programming. Identification needs to be based on practices that recognise the diversity of characteristics of children. Before any enrichment is contemplated appropriate feedback in the classroom and in the home is important. Although enrichment is the way to develop the potential of the gifted, the crucial role of nurturing cannot be underestimated. The classroom teacher has a major responsibility to meet the needs of the gifted irrespective of the breadth of characteristics displayed by ensuring the development and maintenance of a positive self concept within a supportive environment.

Finally, the delivery of appropriate enrichment interventions need to reinforce opportunities for children to become autonomous learners. Intervention programmes may need to be conducted in environments where feedback and social interaction involving peers is a key feature. These principles were enunciated in response to much of the research of the early 80's when Assagioli (1987) argued that the any programme for the gifted should be founded on a range of principles including the use of active methods and expressive techniques, differentiation of curriculum, education of the imagination and feelings and human relationships.

The practical implementation of such programmes will require systemic policies that provide for educational opportunities for gifted children in environments where they are able to share experiences with their peers. Implications also exist for preservice and inservice education of teachers to enhance their understanding of affective as well as cognitive issues concerning giftedness. Education for the gifted is not an option but a right. Failure to provide for the gifted not only conflicts with social justice principles but reinforces mediocrity in education and will undermine any pretentions towards becoming a "clever country".

REFERENCES

Assagioli, R. (1987). The education of the gifted and highly gifted children. *Gifted Education International, 5*(1), 52-56.

Betts, G. T. (1986). The autonomous learner model for the gifted child. In J. S. Renzulli (Ed.), *Systems and models for developing programs for the gifted and talented,* (pp. 27-56). Mansfield Center CT: Creative Learning Press, Inc.

Betts, G., & Neihart, M. (1988). Profiles of the gifted and talented. *Gifted Child Quarterly, 32*, 248-253.

Borkowski, J. G., & Kurtz, B. E. (1984). Metacognition and special children. In B. Gholson & T. Rosenthal (Eds.), *Applications of cognitive-developmental theory (*pp. 193-213). Orlando, FL: Academic Press.

Butler-Por, N. (1993). Underachieving gifted students. In K. A. Heller, F. J. Mönks, & A. H. Passow, (Eds.), *International handbook of research and development of giftedness and talent* (pp 649-668). Oxford: Pergamon.

Cheng, P. (1993). Metacognition and giftedness: The state of the relationship. *Gifted Child Quarterly, 37*(3), 105-112.

Davidson, J. E.(1986). The role of insight in giftedness. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of Giftedness* (pp. 201-222). New York: Cambridge University Press.

Davis, G. A., & Rimm, S. B. (1985). *Education of the gifted and talented.* 2nd ed. Boston: Allyn and Bacon.

Department of Education, Queensland, (1988). *Counselling gifted and talented children* [videorecording]. Brisbane: Dept. of Education, Queensland.

Feldhusen, J. F., & Hoover, S. M. (1986). A conception of giftedness: Intelligence, self concept and motivation. *Roeper Review, 8*(3), 140-143.

Fox, L. H. (1981). Instruction for the gifted: Some promising practices. *Journal for the Education of the Gifted, 4*, 246-254.

Freeman, J. (1993). Parents and families in nurturing giftedness and talent. In K. A. Heller, F. J. Monks, & A. H. Passow, (Eds.), *International handbook of research and development of giftedness and talent* (pp 669-683). Oxford: Pergamon.

Gagné, F. (1985). Giftedness and talent: Reexamining a reexamination of the definitions. *Gifted Child Quarterly, 29*, 103-112.

Garcia, T., & Pintrich, P. R. (1994). Regulating motivation and cognition in the classroom: The role of self-schemas and self-regulatory strategies. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 127-153). Hillsdale, NJ: Lawerence Erlbaum Associates.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

George, W. C. (1983). Research issues in education America's gifted youth. *Gifted Child Today, 27*, 20-21.

Hafenstein, N. L. (1990). *The Relationship of intellectual giftedness, information processing style, and reading ability in young gifted children.* Eric Document ED 320385.

Horowitz, F., & O'Brien, M. (1985). *The gifted and talented: Developmental perspectives.* Washington, DC: U.S. Government Printing Office.

Khatena, J. (1989). Intelligence and creativity to multitalent. *Journal of Creative Behaviour, 23*(2), 93-97.

Kurtz, B. E. (1990). Cultural influences on children's cognitive and metacognitive development. In W. & F. E. Weinert (Eds.), *Interactions among aptitudes, strategies, and knowledge in cognitive performance* (pp. 177-199). New York: Springer Verlag.

Leder, G. C. (1987). Teacher student interaction: A case study. *Educational Studies in Mathematics, 18*, 255-271.

Luria, A. R. (1973). *The working brain.* New York: Basic Books.

Minister for Education, Queensland, (1994). *Queensland Curriculum Review, Shaping the Future: Summary of Recommendations.* Brisbane: Office of the Minister of Education.

Moss, E. (1990). Social interaction and metacognitive development in gifted preschoolers. *Gifted Child Quarterly, 34*, 16-20.

Paris, S .G., & Winograd, P. (1990). Promoting metacognition and motivation of exceptional children. *Remedial and Special Education, 11*, 7-15.

Passow, A. H., Monks, F. J., & Heller, K. A. (1993). Research and education of the gifted in the year 200 and beyond. In K. A. Heller, F. J. Monks, & A. H. Passow, (Eds.) *International handbook of research and development of giftedness and talent* (pp 883-903). Oxford: Pergamon.

Portes, P. R. (1991). Assessing children's cognitive environment through parent-child interactions. *Journal of Research and Development in Education, 24*(3), 30-37.

Renshaw, P. D., & Gardner, R. (1990). Process versus product task interpretation and parental teaching practice. *International Journal of Behavioural Development, 13*(4), 489-505.

Renzulli, J. S. (1978). What makes giftedness? *Phi Delta Kappan, 60*(3), 180-184, 261.

Review of the Queensland School Curriculum (1994). *Shaping the future.* Brisbane: Qld Gov Printer.

Schunk, D. H., & Swartz, C. (1993). Writing strategy with gifted students: Effects of goals and feedback on self-efficacy and skills. *Roeper Review, 15*, 225-230.

Sisk, D. (1980). Issues and future directions in gifted education. *Gifted Child Quarterly*, 24, 29-32.

Sternberg, R. J. (1986). Identifying the gifted through IQ: Why a little bit of knowledge is a dangerous thing. *Roeper Review, 8*(3), 1986.

Sternberg, R. J. (1990). *Metaphors of mind: Conceptions of the nature of intelligence.* Cambridge: Cambridge University Press.

Sternberg, R. J. (1993). *Procedures for identifying intellectual potential in the gifted: A perspective on alternative "Metaphors of Mind".* In K. A. Heller, F. J. Monks, & A. H. Passow, (Eds.) *International handbook of research and development of giftedness and talent* (pp 185-207). Oxford: Pergamon.

Tannenbaum, A. J. (1983). *Gifted children: Psychological and educational perspectives.* New York: Macmillan.

Torrance, E. P. (1974). *Torrance tests of creative thinking: Norms-technical manual.* Bensenville, IL: Scholastic Testing Service.

Torrance, E. P. (1986). Teaching creative and gifted learners. In M. C. Wittrock (Ed.), *Handbook of Research on Teaching*, 3rd ed. (pp. 630-647). New York: Macmillan.

Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes.* Cambridge MA: Harvard University Press.

Watters, J. J. (1993, July). *Cognitive style and science achievement.* Paper presented at the 23rd Annual Conference of the Australasian Science Education Research Association, Lismore NSW.

Watters, J. J. & English, L. S. (1995). Children's application of simultaneous and successive processing in inductive and deductive reasoning problems: Implications for developing scientific reasoning. *Journal of Research in Science Teaching, 32*(7), 699-714.

Weinstein, R., Marshall, H., Brattesani, K., & Middlestadt, S. (1982). Relationships between classroom process variables and middle school science achievement. *Journal of Educational Psychology, 74*, 678-692.